International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.317

PV Based Health Monitoring Wearable Suit and Tracking System for Soldiers

N.Praveen raj[1], S.Raja[2], P.Sathesh kumar[3], P.Tamil Selvan[4], I. Joseph David[5]

MR. J. Daniel Sathyaraj[6]

UG Scholars, Francis Xavier Engineering College, Tirunelveli, Tamilnadu, India[1,2,3,4,5]

AP/EEE, Francis Xavier Engineering College, Tirunelveli, Tamilnadu, India[6]

ABSTRACT: In modern world, the Indian army has the largest troop force for use on the battlefield, however the lives of soldiers are not in danger when combat is taking place. However, in modern times, we use to assess the more stable health situation by utilising a doctor to check their body temperature and any other health issue. Currently, we employ implementation to analyse solider health conditions, including their body temperature, oxygen level, and some sensors for full use by the soldier. We also see the health condition to display the detail to the web portal or web page to display the health status and monitor the health conditions. Therefore, we used to fix the sensor to the soldiers' wearing suits. They must identify their health status and press the button in case of an emergency to signal their condition and that of any nearby sick soldiers. If a soldier had a health issue that could make it difficult for them to move about, we would utilise GPS tracking to find them and help them regain their physical condition. This will be put into practise for our soldiers very soon, and we'll be using it to develop a special portal for them that displays their personal information and medical status as well as an analysis of the government portal that's attached. The proposed system keeps track of real time health parameters like heartbeat, blood pressure, body temperature and oxygen level etc. record the data along with location of soldiers and sends the real time information to control room.

.**KEYWORDS:** Temperature Sensor, Humidity Sensor, SPO_2, GPS.

I. INTRODUCTION

In present era, the threat of enemies plays an important role in security policies of any state. In this prospective, the military soldiers plays an important and vital role. There are several considerations concerning the security of those troopers. So for the security purpose of troopers, a number of equipment or devices are attached with them to take the look on their health status and their ammunitions. Health relating sensors like pulse rate sensor, body temperature measuring sensor, transmission and processing capabilities, can thus help to make low-cost wearable solutions for health monitoring. GPS used for basically point the latitude and longitude to find exact location of soldier. RX module can be used for effective range of high-speed transmission that will be required to relay information on situational awareness, tactical instructions, and covert surveillance related data during special operations reconnaissance and other missions. So by using these equipment's we are trying to implement the basic life guarding system for soldier in low cost and high reliability.

II. PROPOSED SYSTEM

Although soldiers are crucial to maintaining national security, they frequently perish in life-threatening circumstances due to a lack of real-time health status information and communication difficulties with the control room. The proposed Internet of Things-based system for tracking soldiers' locations and tracking their health records both of these variables constantly, sending the data to a control center. Action can be done right away in a short amount of time if any anomalies in the soldier's health are found. The proposed system consists of two units, one of which is a soldier's wearable unit with a heartbeat sensor, temperature sensor, oxygen level indicator, and other components that track the position of the soldier using GPS technology and monitor health conditions.
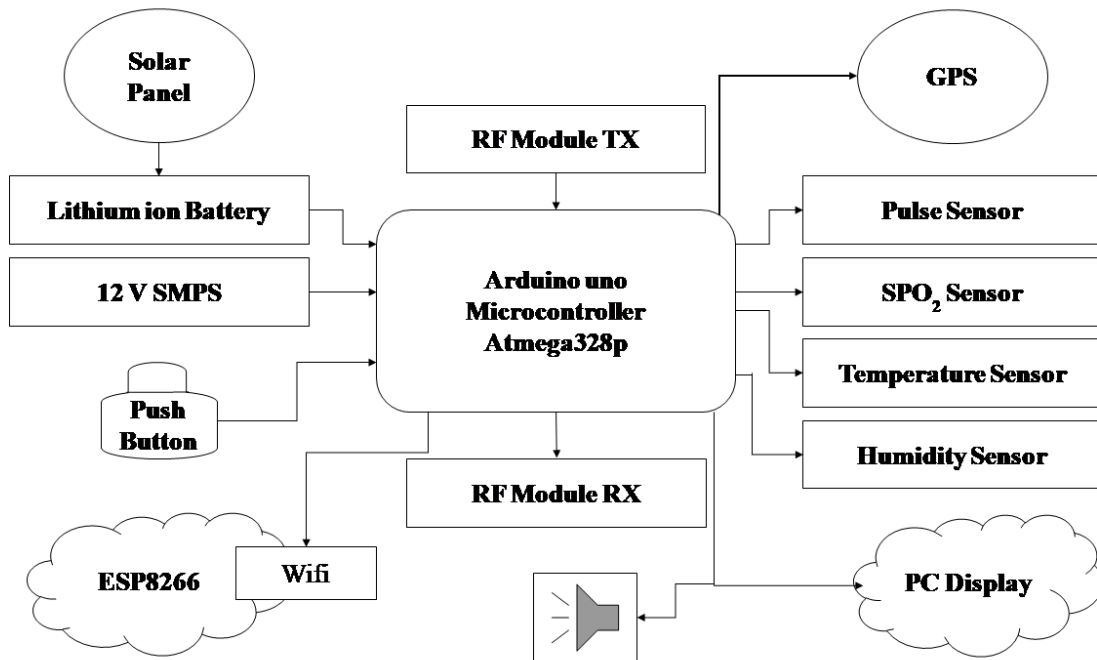
PIN DIAGRAM:
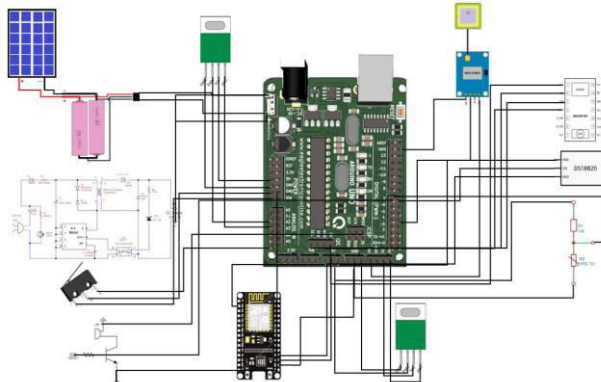
BLOCK DIAGRAM:

Fig 1 Block Diagram

BLOCK DIAGRAM DESCRIPTION:

The power source for this project is renewable energy, thus we used solar panels to generate electricity, rechargeable batteries to store it, and non-powered locations to utilise the battery power. Here, we use a variety of sensors to monitor the health of the soldier, including sensors for the temperature, humidity, oxygen level, and pulse. We use the radio frequency transmitter module to transmit the data from the sensors to the control room, where they are all connected to the Arduino Uno and collecting data from every unit. The SMPS is used in place of the same Arduino Uno controller as the power source. To collect data from the transmitter and present it on the computer monitor, we have attached the radio frequency receiver end here.

COMPONENTS USED
ARDUINO UNO:

The Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

RECHARGEABLE BATTERY:

This battery module is made up of ICR 18650 1500mAh Lithium-Ion Batteries of the highest quality with a BMS circuit. In comparison to Ni-Cd, Ni-MH, and lead-acid batteries, it is compact and light. The battery pack may be directly charged with the DC power adapter thanks to the inbuilt charge protection circuit, eliminating the need for specialized battery chargers and the risk of overcharging. This battery pack is incredibly simple to recharge and integrate into your project.

SOLAR PANEL:

This solar panel is made of single-crystal material that performs high solar energy transformation efficiency at 17%. These are waterproof, scratch resistant, and UV resistant. They use a high efficiency monocrystalline cell. They output12V at 300mA. The substrate is a plastic composite, specifically designed to be strong and lightweight. They can easily stand up to typical outdoor use including being dropped and leaned on. They're very high quality and suggested for projects that will be exposed to the outdoors.

GPS:

The NEO-6 module series is a family of stand-alone GPS receivers featuring the high-performance u-blox 6 positioning engine. These flexible and cost-effective receivers offer numerous connectivity options in a miniature 16 x 12.2 x 2.4 mm package. Their compact architecture and power and memory options make NEO-6 modules ideal for battery operated mobile devices with very strict cost and space constraints.The 50-channel u-blox 6 positioning engine boasts a Time-To-First- Fix (TTFF) of under 1 second. The dedicated acquisition engine, with 2 million correlators, is capable of massive parallel time/frequency space searches, enabling it to find satellites instantly. Innovative design and technology suppresses jamming sources and mitigates multipath effects, giving NEO-6 GPS receivers excellent navigation performance even in the most challenging environments.

PULSE OXIMETER HEART RATE SENSOR:

Maxim's MAX30100 integrated pulse oximetry and a heart-rate sensor are included in the Heart Rate click. It's an optical sensor that measures the absorbance of pulsating blood through a photodetector after emitting two wavelengths of light from two LEDs, a red one and an infrared one. This particular LEDcolour combination is designed to allow data to be read with the tip of one's finger.A low-noise analogue signal processing device processes the signal before sending it to the target MCU through the mikroBUS I2C interface. Excessive motion and temperature changes can affect the readings, thus developers of end-user apps should keep that in mind. Furthermore, too much pressure can limit capillary blood flow, reducing the data's trustworthiness. There's also a programmable INT pin. The device runs on a 3.3V power supply.

TEMPERATURE SENSOR:

The ultra-small size, low hardware overhead, powerful anti-interference capability, and high accuracy of the DS18B20 Waterproof Temperature Sensor Module, among other features, have increased its appeal among customers. For electronic enthusiasts and hobbyists who wish to learn about and build temperature-dependent prototypes, the DS18B20 is an excellent place to start.

RF MODULE TX RX:

HC-12 wireless serial port communication module is a new-generation multichannel embedded wireless data transmission module. Its wireless working frequency bandis433.4-473.0MHz, multiple channels can be set, with the stepping of 400 KHz, andthere are totally 100 channels. The maximum transmitting power of module is100mW (20dBm), the receiving sensitivity is -117dBm at baud rate of 5,000bps intheair, and the communication distance is 1,000m in open space.

TEMPERATURE AND HUMIDITY SENSOR:

The DHT11 is digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and outputs a digital signal on the data pin (no analog input pins needed). It's very simple to use, and libraries and sample codes are available for Arduino and Raspberry Pi.

SMPS:

This power source for the isolation industrial-grade built-in power supply module, temperature protection, and short circuit protection, AC85 ~ 265 v input voltage, wide 431 precision voltage stability DC5V output, with mounting holes, with input and output EMI filter circuit, small volume, stable performance, cost-effective.

NODE MCU WIFI MODULE:

The ESP-12 Lua Nodemcu WIFI Dev Board Internet Of Things with ESP8266 is an all-in-one microcontroller + WiFi platform that is very easy to use to create projects with WiFi and IoT (Internet of Things) applications. The board is based on the highly popular ESP8266 WiFi Module chip with the ESP-12 SMD footprint. This WiFi development board already embeds in its board all the necessary components for the ESP8266 (ESP-12E) to program and uploaded code. It has a built-in USB to serial chip upload codes, 3.3V regulator, and logic level converter circuit so you can immediately upload codes and connect your circuits. This board contains the ESP-12E chip with a 4MB! a flash memory so no worries for your long project codes!.This microcontroller board can easily be programmed using the Arduino IDE programming software.

BUZZER:

This is a small buzzer module that operates around the audible 2 kHz frequency range. It is an active buzzer, which means that it produces sound by itself, without needing an external frequency generator.It can easily be used with microcontroller boards, like Arduino, without needing a dedicated PWM channel.

PUSH BUTTON:

This limit switch module when activated makes the 'NO' pin to HIGH and 'NC' pin to LOW and also the LED present in this module will glow in RED. When the limit switch is deactivated, it makes the 'NO' pin to LOW and 'NC' pin to HIGH and the LED will glow in GREEN. These Limit switch modules are used for sliders, 3D printers, and robotics project.

III. CONCLUSION

The design was way more effective than we originally thought off at the start of our project. We tried following ethics in designing and implementation of the project. We won't claim that our circuit had 100% efficiency, as it did show some variance that we minimized to some extent. The good thing, we noted that there is a lot of possibility to make enhancements in this project. Our system is for one soldier. The communication between soldiers to control room can be established. This system gives strength to the defense system of our country. So, we can accomplish that these types of strategies are very supportive for certifying security of the soldiers.
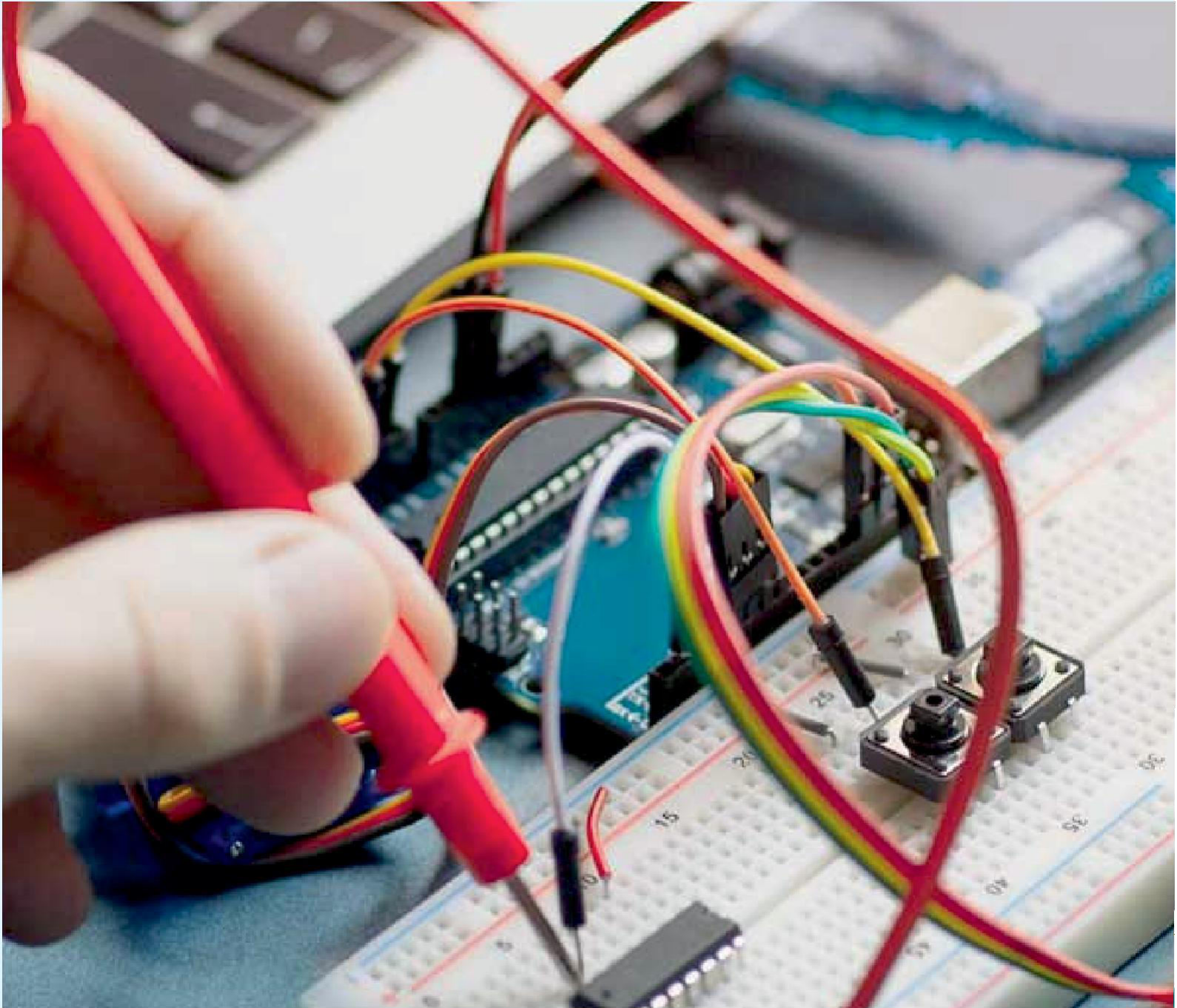
REFERENCES

[1] Veena Tripathi and Faizan Shakeel, Monitoring "Health Care System using Internet of Things - An ImmaculatePairing", 2017 International Conference on Next Generation Computing and Information Systems (ICNGCIS).

[2] Vaishnavi Patil, Sanjay Singh Thakur ,VaibhavKshirsagar, "Health Monitoring System using Internet of Things" ,Proceedings of the Second International Conference on Intelligent Computing and Control Systems (ICICCS 2018).

[3] Emre Oner Tartan and CebrailCiflikli,"An android application for geolocation based healthmonitoring, consultancy and alarm system", 2018 42nd IEEE International conference oncomputer software and applications.

[4] Yang Gu1, Jianfei Shen and Yiqiang Chen, "poster abstract: know you better: a smart watch based health monitoring system", 2019 IEEE/ACM international conference on connected health: applications, systems and engineering technologies(CHASE).

[5] Niket Patel and Brijesh Iyer," Health monitoring and tracking system for soldiers using Internet of Things", International conference on computing, communication and automation (ICCCA2017).

[6] Iftekhar Uddin Ahmed ,Nazia Hassan andHumayun Rashid ,"solar powered smart wearable health monitoring and tracking device based on GPS and GSM Technology for children with Autism, proceeding of the 2017 4th international conference on advance of electrical engineering.

[7] Vivek Pardeshi, Saurabh Sagar, Swapnil Murmurwar and Pankaj Hage, "Health MonitoringSystems using IoT and Raspberry Pi – A Review", International Conference on Innovative Mechanisms for Industry applications(ICIMIA 2017)

[8] An Overview of Wearables Market to be Worth 25 Dollars Billion by 2019, CCS Insight, London, U.K., 2016. Accessed: Dec. 31, 2021.

[9] A. S. Khan and F. U. Khan, ''Experimentation of a wearable self-powered jacket harvesting body heat for wearable device applications,'' J. Sensors, vol. 2021, pp. 1–22, Dec. 2021, doi: 10.1155/2021/9976089.

International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering